

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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## COMPLETE SPECIFICATION

### Propping Means for Packing and Transporting Requisites

We, WERNER ACHERMANN and FRANZ ACHERMANN both of Zurich, Rümliangstrasse 71 (Switzerland) both of Swiss Nationality do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

Transport and packing requisites such as pallets, containers, boxes and the like made of wood, cardboard or corrugated board, are known per se, and the bottom thereof or supporting ledges provided thereon form therewith a rigid whole. For storing, the support at a distance of said requisites from the floor or ground is important, and for stacking storage the maintenance of a suitable distance from each other is important, so that said requisites may be readily seized by the fork of a lift-truck for moving.

The present invention relates to propping means for packing and transporting requisites such as pallets, containers, boxes and the like. According to the invention, said means are distinguished in that supporting joists are provided at the bottom which are formed as foldable hollow profiles, foldable stiffening elements of V-section being removably disposed in said profiles to act as cross- and longitudinal braces.

The joists may be of polygonal hollow section.

Various forms of the invention are shown in the drawings, in which—

Fig. 1 is a perspective view of a pallet of a first example,

Fig. 2 is a side view with folded supporting joist,

Fig. 3 is a partial view of a supporting joist,

Fig. 4 is a partial view of a stiffening element,

Fig. 5 shows in perspective a pallet of a second form of the invention,

Fig. 6 is a partial view of an appurtenant supporting joist,

Fig. 7 is a similar view of the stiffening element,

Figs. 8 and 9 show further variants of the supporting joist.

Fig. 10 is a detail of Fig. 9,

Fig. 11 shows in perspective a third example in the form of a container with partly opened bottom and provided with supporting joists,

Fig. 12 is a view similar to Fig. 11 but with closed bottom,

Fig. 13 is a view similar to Fig. 11 of a fourth example,

Fig. 14 is a view similar to Fig. 13 but with closed bottom,

Fig. 15 seen from below, shows a foldable pallet,

Fig. 16 shows the two half portions of the pallet of Fig. 15, partly folded,

Fig. 17 shows the pallet of Figs. 15, 16 in the folded state,

Fig. 18 depicts a V-shaped stiffening element,

Fig. 19 illustrates a stiffening element formed by two adjacent V-profiles,

Fig. 20 shows a supporting joist destined to take up a V-shaped stiffener, and

Fig. 21 depicts a supporting joist including a stiffening element formed of two continuous V-profiles.

In Figs. 1 to 4, 1 designates the pallet formed of a corrugated cardboard sheet 1' and a double sheet 1'' of corrugated cardboard adjacent to the underside of sheet 1', and of three supporting or propping joists 2 and 3. Said pallet is of rectangular base form and on its two longitudinal sides comprises propping joists 2 folded down from sheet 1' and integral therewith. The joists

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2, 3 are square hollow profiles of corrugated cardboard or other stiff material. The pallet is engageable from the bottom by the fork of a lift-truck from two opposite sides by introduction between the joists. V-shaped stiffeners 6 of corrugated cardboard or other suitable material are removably inserted in the joists and serve as cross and longitudinal braces. The two exterior joists 2 with their legs 2' which are adjacent to the double sheet 1'', are pasted or glued to the latter. Joist 3 with its overlapping glued legs 4 forms a square hollow profile of which the leg that is at right angles to the legs 4 is glued to the double sheet 1''. Each stiffener 6 with its ridge 6' is engaged in a longitudinal groove 7 on the inside of the joists 2 and 3, while the free leg edges 6'' of the stiffeners are supported on the edge angles of the joists 2, 3 which face the bottom. In this way the supporting joists are very effectively braced and have a high bending strength.

The cardboard corrugations run from the pallet bottom 1', 1'' at right angles to the joists 2 and 3, i.e. in the direction of the arrows A. At the joists 2, 3 and the stiffeners 6 the corrugations also run in the direction of the arrows A indicated in Figs. 1 and 4.

When not used and shipped empty, the joists 2, 3 are collapsed and folded flat (Fig. 2), after having withdrawn the stiffeners 6, so that the joists require only little space.

The pallet 1 according to Fig. 5 may be seized below by a fork from four sides. The bottom also comprises corrugated cardboard leaves 1', 1'' which are glued to each other. On the underside of the bottom leaf 1'' are fixedly located by gluing three joists 2 formed by spaced portions 3, 3' and 3''. In the hollow spaces thereof are withdrawably inserted the V-shaped stiffeners 6. The spaces between the joists 3 on one hand and between the joist portions 3, 3' and 3'', 3'' on the other hand serve for the introduction of a fork (not shown) of a lift-truck. In this example also the run of the cardboard corrugations is indicated by the arrows in Figs. 5 to 7. The joists 3, 3', 3'' are formed similar and disposed at the pallet bottom as in the first example and may be collapsed or folded down as shown in Fig. 2 after having removed the stiffeners 6.

In Figs. 8 and 9 are shown joists 8 which close the hollow space with shortened end-legs 4' while forming a longitudinal groove 7. These shortened legs 4' with their outsides which are provided with adhesive, are glued to the bottom member 1', 1'' of the pallet or to the bottom of a container or box. In Fig. 9 the longitudinal groove 7 is given a greater depth by beading or crimping inwardly the shortened legs 4'.

The sides of the joists 2, 3 that have to be glued to the bottom of a pallet or a box

or container, are provided with permanent adhesive faces 5, see Fig. 6. The latter before being stuck-on are protected, as known, by readily detachable cover foils.

Figs. 11 and 12 show a container or box 9 of which the bottom is formed by two inner and two outer opposite bottom parts 9', 9'' that are disposed as flaps. The bottom parts 9'' carry the joists 3, namely two exterior joists and a two-part intermediate joist. The exterior joists 3 are glued to the exterior longitudinal edges of the container. The intermediate joist 3 is formed of two parts 13 of equal length which in the position of closure of the bottom parts 9'' are co-axially joined to each other and cover the joint 10 between the two bottom parts 9''. One joist part 13 is glued to the facing left-hand bottom part 9'' and the other joist part is glued to the facing right-hand bottom part 9''. The joist parts 13 comprise on their exterior legs 4 and extension 14 which serve as adhesive flange and aim to give a better support on the bottom part. In each joist 3 is again inserted a stiffener 6 which interconnects the two parts 13 of the intermediate joist 3 so that the bottom parts 9'' of which each carries a joist part 13, are locked in their closed position. The top side of the container is conventionally closable. Obviously the additional support is more suited for containers and the like of great volume and weight, which are transported by lift-trucks. When withdrawing the appurtenant stiffener from joist 3 up to joint 11 or by total withdrawal, the connection between the joist parts 13 is canceled so that the bottom parts 9'' of which each carries a joist part 13, may be swung to their open position. After removing the stiffeners 6, the joists 3 may be folded flat. To facilitate insertion of the stiffeners 6, the latter on one endside, the longitudinal sides 6'' and on the apex are bevelled at 15 and 15' (Figs. 4 and 7).

The container 9 in Figs. 13 and 14 is provided with three supporting joists 3 of which each comprises two separate joist parts 13 which are glued to the exterior bottom parts 9'' athwart to the hinges thereof. Each bottom part 9'' carries, as shown in Fig. 14, three joist parts 13 which in the closed position of the bottom parts 9'' are united to a single joist 3 by the insertion of stiffeners 6, and these joists are as long as a complete joist 3 and are rigidly interconnected in the position of use.

Figs. 15 to 17 show a pallet 1 that is foldable in two half portions, and the joists 3 thereof extend athwart of the fold 16 and are subdivided in half their length. One joist part 13 is connected to one pallet half-portion, and the other part 13 to the other half-portion. The pallet 1 is made up to a rigid structure by insertion of the stiffeners 6 to connect the two-part joists 3. Folded pallets

when not in use, may be stacked on top of each other to save storage space. When folding the pallets are as shown in Figs. 16 and 17, the joists also are folded flat of course.

- 5 The additional support described for transport and packing requisites is particularly distinguished by a surprisingly high strength against tensile stresses, vertical and lateral pressure, bending and torsion. Its price is relatively cheap and permits to discard a transport requisite after short use. The additional support and the appurtenant transport or packing requisite may be impregnated so that they may be exposed to the weather.
- 10 The foldable or collapsible joists also may be marketed single, as they are readily attachable to transport requisites such as pallets, boxes, containers and the like by gluing.

- A V-profile as shown in Fig. 18 or an element made-up of two V-profiles as shown in Fig. 19 may serve as stiffener for insertion in a supporting joist 3 and 4 formed as square hollow profile. To produce clean folding edges, in particular ridges 6' of the V-profiles 6, folding grooves 7 for a stiffener 6 or a joist 3 are provided on the face of blank 1' that serves as interior side of the hollow profile, which grooves close themselves about the folding groove 7 when bending the cardboard. For the engagement of the ridges 6' of a V-profile stiffener 6 in Figs. 18 and 19, grooves 7 also are cut and pressed on the hollow-profile inside of joist 3 at the respective points. These guiding grooves 7 facilitate insertion of the stiffener 6, firmly locate same in joist 3 and stiffen, on the other hand, the cross-sectional shape of the joist. By providing buckling folds 7' on the vertical sidewalls of joist 3 (Fig. 20) it is assured that in the case of high loading the sidewalls will bend inwards and not outwards and thus hold the stiffener in place still better. The load pressure on joist 3 is taken-up in each case by stiffener 6 alone, which fact calls for the use of high-grade corrugated cardboard such as "corrugated fiber-board" therefor, known to those skilled in the art. Thanks to the accommodation of the entire load by the stiffeners, the wall thickness of the joists 3 may be made relatively very thin. For this reason, a cardboard with close corrugations may be used, but it has to be of good quality since it will be subjected in use both mechanically and to tension on the bottom face of the joist. Faultless folding of the joists can only be obtained by the use of single-corrugation thin kinds of card-board.

- To facilitate insertion of stiffener 6 into joist 3, the edges on at least one front may be eliminated by a rounding-off.

- Easy foldability of the joists, after having withdrawn the stiffeners therefrom, is favored by using a cardboard that has fine corrugations and suitably may be impregnated water-

proof on both sides or be plastic-coated or laminated.

The hollow square joist and the diagonal stiffener suitably are provided with edges that are free of outside folds and bent over inside folds.

The supporting structure formed by joists and stiffeners inserted therein is particularly suited for pallets, containers and box pallets to which they are applicable thanks to their shape formed as square hollow profile at any desired point on the bottom of a transport requisite and, further, is given a high load capacity, thanks to the diagonal stiffener.

Joists and stiffeners preferably may be made of waterproof material such as corrugated cardboard impregnated or plastic-coated on both sides, but also of plastic, wood or sheet-iron.

The diagonal bracing of the joist profile by the stiffener is ensured by the engagement of the longitudinal edges of the latter in grooves provided on the joist inside. These grooves fix the stiffener in its most effective position. The guide groove assumes the function of the pressure or thrust axis which renders possible the self-bracing action of the stiffener with increasing load. Thanks to the guide groove, the stiffener is readily and positively insertable into the joist.

A V-stiffener comprising a plural-layer corrugated cardboard is distinguished by high loadability, is twistproof, of light weight and is much cheaper than a conventional stiffener made of corrugated cardboard layers stacked on top of each other. The stiffener disclosed by the present invention saves room when not used, i.e. when not inserted yet.

Since, above all, the containers possess the best static properties in the range of their exterior walls, and the intermediate spaces between the joists in the case of small containers would be too narrow for easy handling with lift-trucks, the hollow joists according to the invention were brought to an annular assembly, either as a pre-fabricated closed unit or with an intermediate space that forms the guide groove, in order to provide the statically and functionally most favorable position for the attachment of the joists.

As the greatest enemy of corrugated cardboard has been found to be moisture, it has been provided that the joists as well as their stiffeners be protected by appropriate means and measures such as impregnation, plastic-coating on both sides, waterproof lining with conventional packing machines and packing systems such as electrostatic welding in waterproof foils, shrinkfoils and the like, or by providing special protective devices and means.

Particularly for repeated use of the transport requisites reinforced by the stiffeners disclosed, it appears suitable to also use other materials in place of corrugated cardboard,

4  
5 which on account of their particular properties and possibilities of manufacture are suited for the production of the propping means, such as impregnated stiff pasteboard, plastic, wood, sheet-iron as well as proper combinations thereof.

10 In the case of two-part joints provided on bottom flaps, a double function is attained by the insertion of the stiffeners, namely the positive longitudinal and crosswise bracing as well as a strong and quick-action bottom closure.

15 Two and more transport requisites provided with supporting joists, such as containers and boxes, may be effectively coupled to a detachable unit by the insertion of long and continuous stiffeners. It is desirable for transport to combine several small bundles and trusses to form a transport unit so as to save handling and manipulation in loading and shipping.

#### WHAT WE CLAIM IS:—

25 1. Propping means for packing and transporting requisites, comprising in combination supporting joists on the bottom of said requisites, which are formed as hollow profiles which may be folded flat, and stiffeners which may be folded flat, withdrawably disposed in said joists, said stiffeners which are of V-section constituting longitudinal and cross-braces.

30 2. Propping means as set forth in claim 1 in which the joists are of square hollow section.

35 3. Propping means as set forth in claim 1 and 2 in which said joists and stiffeners are made of corrugated cardboard, the corrugations thereof running at right angles to the longitudinal direction thereof.

40 4. Propping means as set forth in claim 3 in which the stiffener ridges point upwardly and are engaged in longitudinal grooves on the upper inside of said joists, while the stiffener legs abut against the inside edges of the joist bearing-faces.

45 5. Propping means as set forth in claim 3 in which the joists on their outer top sides are provided with selfsticking areas and there-through are fixable to the transport requisite.

50 6. Propping means as set forth in claim 1 in which the said joists on their inner top-side, the side adjacent to the area for fixing to the transport requisite, are provided with two shortened legs, which abut against each other and at this joint are shaped to form a longitudinal groove which is used to engage a ridge which the said stiffener is provided with.

55 7. Propping means as set forth in claim 6 in which the abutting terminal joist legs that through their joint form the longitudinal groove, comprise inwardly crimped longitudinal edges by which is formed an additional indentation or depression of the grooves for engaging the stiffener ridges.

8. Propping means as set forth in claim 65 1 in which the joists on their top sides comprise overlapping terminal legs glued to each other, which legs are connected to the outside of the transport requisites.

9. Propping means as set forth in claim 70 1 in which exterior joists are integral with a leaf of the transport requisites.

10. Propping means as set forth in claim 75 1 in which the joists are arranged on foldable bottom portions of the transport requisite.

11. Propping means as set forth in claims 1 and 10 in which joists disposed on flaps are made of two parts which are interconnected by the inserted stiffeners.

12. Propping means as set forth in claim 80 1 in which the ends of the stiffeners are provided with ridges and free longitudinal sides which are bevelled for the purpose of facilitating insertion into the joists.

13. Propping means as set forth in claim 85 1 in which as stiffener is used a profile that has at least two side legs disposed at an angle to each other and of which the ridges are engaged in guide grooves disposed on the inside of the hollow joist, wherein the latter is positively braced in a diagonal sense.

14. Propping means as set forth in claims 90 1 and 13 in which the hollow joist and the stiffener inserted therein have edges free of outside folds and bent over inside folds.

15. Propping means as set forth in claims 95 1 and 13 in which the stiffener at the ends of its longitudinal edges is provided with rounded points.

16. Propping means as set out in claims 100 1 and 13 in which the stiffener forms a V-profile of which the ridge is pointed upwardly and is engaged in a guide groove on the joist inside, while the longitudinal edges of the V-profile are propped against the folding edges which delimit the bottom part of the joist.

17. Propping means as set forth in claims 110 1 and 13 in which the stiffener comprises at least two adjacent V-profiles of which the ridges are engaged in inside guide grooves of the joist.

18. Propping means as set forth in claims 115 1 and 13 in which the stiffener is made of strong corrugated cardboard or impregnated stiff pasteboard, plastic, wood, sheet iron or combination thereof.

19. Propping means as set forth in claims 120 1 and 13 in which the joist is made of single-layer finely corrugated cardboard or impregnated stiff pasteboard, plastic, wood, sheet iron or combination thereof.

20. Propping means as set forth in claims 125 1 and 13 in which buckling folds are provided on the outside of the vertical sidewalls of the joist.

21. Propping means as set forth in claims 1 in which the hollow joist in its annular assembly is so formed as to be attach-

able to any desired point of the transport requisite.

22. Propping means as set forth in claims 1 and 13 in which the hollow joist in its annular assembly is so formed as to be attachable to any desired point of the transport requisite flush and aligned with the external wall or external edge.

23. Propped means as set forth in claims 1 and 13 in which the joist and the stiffener inserted therein are protected against moisture by impregnation, coating, packing or wrapping.

24. Propping means as set forth in claims 1 and 11 in which the two-part joists disposed on container-bottom flaps together with the stiffeners inserted therein form a solid bottom closure.

25. Propping means as set forth in claims 1 and 13 in which at least two transport

requisites provided with joists are effectively coupled together by inserting long through-going stiffeners.

26. Propping means as set forth in claim 1 in which said joists are of polygonal hollow section.

27. Propping means for transport and packing requisites, constructed and assembled substantially as described with reference to Figs. 1 to 4, or Figs. 5 to 7, or these Figs as modified by Fig. 8, Figs. 9 and 10, Figs. 11 and 12, Figs. 13 and 14, Figs. 15 to 17, Fig. 18, Fig. 19, Fig. 20, Fig. 21, Fig. 22 and Fig. 23 of the drawings.

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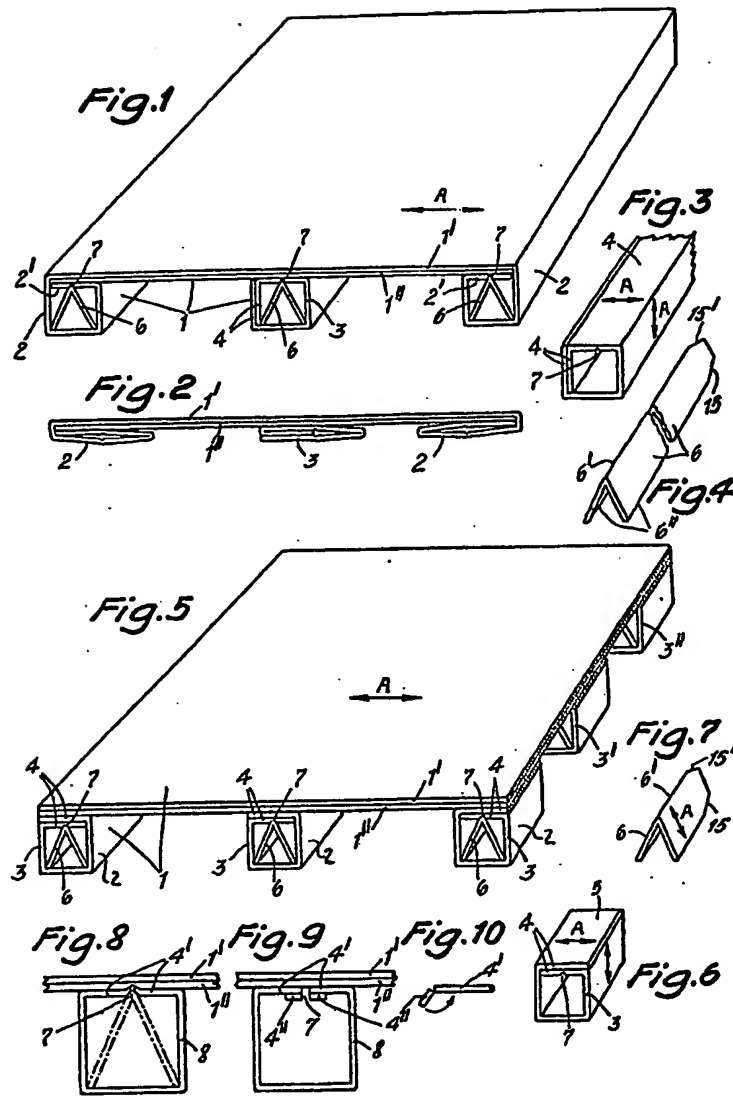


Fig. 11

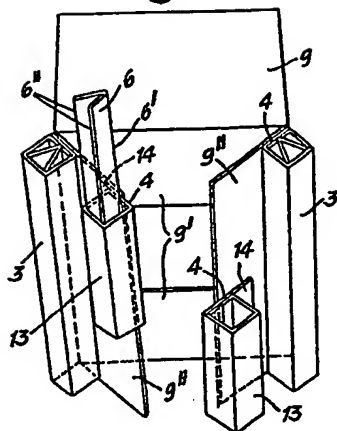


Fig. 13

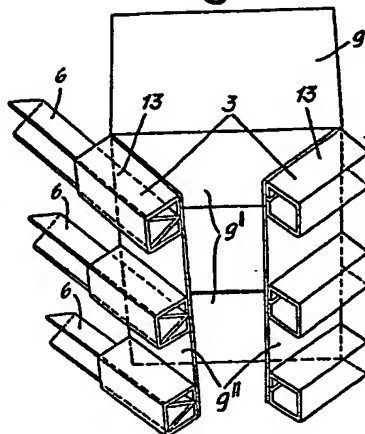


Fig. 12

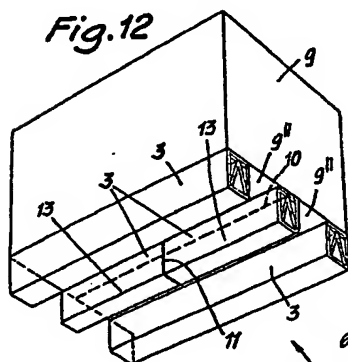


Fig. 14

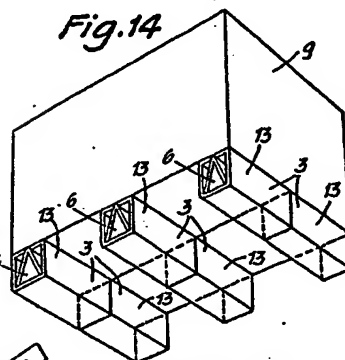


Fig. 16

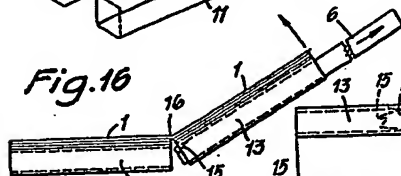


Fig. 17

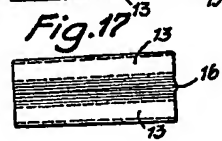


Fig. 15

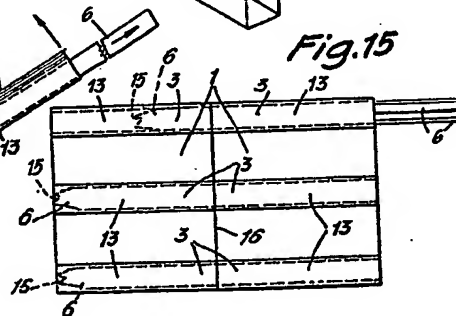


Fig. 18

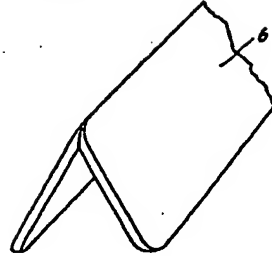


Fig. 19

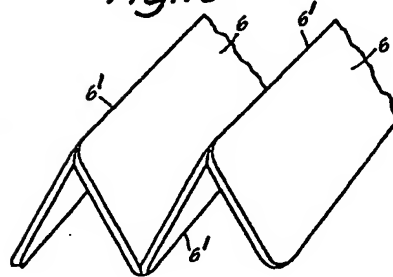


Fig. 20

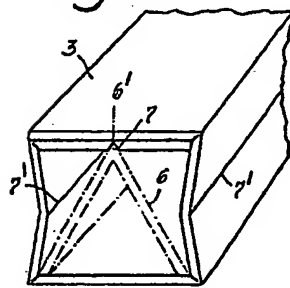
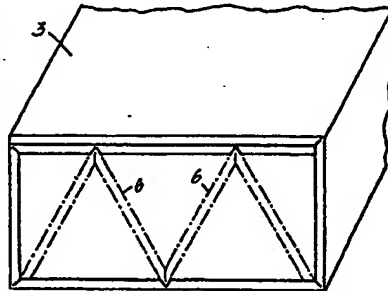


Fig. 21





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